City of Dover

May 30, 2007

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State of Delaware DNREC
Division of Air & Waste Mgt.
Air Quality Management Section
156 South State Street
Dover, DE 19901
Attn: Mr. Ali Mirzakhalili, Program Administrator

Dear Mr. Mirzakhalili:

Enclosed please find our Compliance Plan as required under Delaware Regulation 1145 Section 8.0. This plan outlines the required information for the City of Dover, McKee Run Unit 3, Permit AQM-001/0002, Renewal dated May 1, 2003, which is currently subject to Regulation 1146.

The City of Dover is anxious to become the first stakeholder with an accepted Compliance Plan. If you have any questions on this matter you can contact my office at 736-7005 or Mr. Dean Blaha at 673-6304.

I certify, based on information and belief formed after reasonable inquiry, the statements and information contained in this document are true, accurate and complete.

Sincerely,

Anthony J. DePrima, ACIP
City Manager

AJD/dej
cc: Dean Blaha, NAES
Ron Lunt, City of Dover – Public Utilities
Noel Primos, Schmittinger and Rodriguez
David Small, DNREC
Bob Clausen

Compliance Plan
Regulation 1146 – Electric Generating Unit (EGU) Multi-Pollutant Regulation
McKee Run Generating Station Unit 3

In accordance with the requirements Section 8 of Regulation 1146, Electric Generating Unit (EGU) Multi-Pollutant Regulation, following is a compliance plan for the City of Dover's McKee Run Generating Station Unit 3.

1) Identification of the subject *unit*.

The McKee Run Generating Station Unit 3 (MRGS3) is a #6 residual fuel oil-fired, municipal-owned, electric generating unit with a nameplate capacity of approximately 114 MW. This unit is identified as Emission Unit No. 3 on Title V Permit AQM 001/00002 (Renewal 1) dated May 1, 2003. The subject emission unit single wall-fired, dry bottom boiler manufactured by Riley Stoker that began commercial operation in 1975. The boiler has a nominal heat input rating of 1180 MMBTU/hr and is capable of combusting #6 residual fuel oil and/or natural gas fuel.

MRGS3 traditionally operates in more of a peaking capacity than in a base or intermediate load capacity. Annual capacity factors in recent years have been 10% or less. MRGS3 operates principally in times of tight generation availability due to high electric demand. The unit has also been brought on line to help with voltage stabilization in the central part of Delaware, due to a lack of generation in the central part of Delaware during periods of high demand. Due to the infrequent and somewhat indeterminate nature of operation of MRGS3, operating flexibility and the capability of quick response to grid demands are essential to the future operating value of this unit.

2) A description of any existing NOx, SO_2, and/or mercury *emissions* control technologies installed on the *unit*, including identification of the initial installation date of the control technologies.

Subsequent to the initial startup of this unit, there have been modifications for the reduction of NOx emissions. In compliance with the requirements of DNREC's Regulation 12, Control of Nitrogen Oxide Emissions, the combustion system was modified to a low-NOx emissions configuration in 1995. Additional NOx reductions were attained through the voluntary installation of an over-fire air system in 2003.

MRGS3 does not include any SO2 control technology. Current SO2 emissions are limited through compliance with permitted sulfur-in-fuel content of 1.0% sulfur maximum, by weight.

MRGS3 has no mercury control technologies, and is inherently low in mercury emissions due to the negligible mercury content of the fuels combusted by MRGS3. As MRGS3 is not coal-fired, the mercury emissions limitations and monitoring requirements of Regulation 1146 are not applicable to MRGS3.

3) Identification of the requirements of this regulation applicable to the *unit.*

As a residual fuel oil-fired electric generating unit with a nameplate capacity of greater than 25 MW, the following sections of Regulation 1146 are applicable to MRGS3:

Section 4.1: From May 1, 2009 through December 31, 2011, NOx emissions are limited to 0.15 lb/MMBTU on a rolling 24-hr basis.

Section 4.2: After January 1, 2009, annual NOx mass emissions shall not exceed 244 tons per year.

Section 4.3: On and after January 1, 2012, NOx emissions are limited to 0.125 lb/MMBTU on a rolling 24-hr basis.

Section 4.4: Compliance with the above NOx emissions limitation shall be demonstrated with continuous emissions monitoring systems, or alternate means, approved by the Department and the Administrator.

Section 5.3: On and after January 1, 2009, annual SO2 mass emissions shall not exceed 439 tons per year.

Section 5.4: Compliance with the SO2 mass emissions limitation of Section 5.3 shall be demonstrated with continuous emissions monitoring systems, or alternate means, approved by the Department and the Administrator.

Section 5.5: No #6 fuel oil with a sulfur content in excess of 0.5% by weight shall be received for the subject unit, as confirmed through sampling and testing of fuel oil shipments received for the unit or as-fired by the unit.

Section 7: This section includes several recordkeeping and reporting requirements that are all applicable to MRGS3.

Section 8: This section requires the submittal of a compliance plan no later than July 1, 2007. This document fulfills this requirement.

4) and 5) A description of the plan or methodology that will be utilized to demonstrate compliance with this regulation. Identification of emission control technologies, and/or modifications to existing emission control technologies, that will be utilized to comply with the applicable *emissions* limitations of this regulation.

Mercury: As MRGS3 is not coal-fired, the mercury emissions limitations and monitoring requirements of Regulation 1146 are not applicable to MRGS3.

SO2: For residual oil-fired electric generating units, Regulation 1146 limits SO2 emissions to that achieved by firing residual fuel oils with a maximum sulfur content of 0.5%, by weight. Compliance with this emissions limitation shall be achieved through limiting the purchase of residual fuel oils to a maximum sulfur content of 0.5% by weight and shall be demonstrated through sampling and analysis of the residual fuel oil. It is anticipated that the switch to 0.5% sulfur fuel oil will occur no later than May of 2008.

NOx: As identified earlier, MRGS3 has previously been the subject of combustion system modifications for reduced NOx emissions in compliance with existing DNREC regulations, and subsequently further modified for additional NOx reductions through the voluntary installation of an over-fire air system. In order to comply with the stringent NOx emission rate limitations of Regulation 1146, it has been determined that additional modifications will be necessary. A multifaceted approach has been identified to build on the existing investment in NOx reduction capability and provide the flexibility necessary for the continued economic operation of the unit.

Early technical evaluation has indicated that additional tuning of the existing combustion system may result in additional NOx emissions reductions beyond those already achieved. These technical evaluations are ongoing to identify those tasks that result in NOx emissions reduction on this particular unit, based on design, fuels, operating characteristics, etc. Items under investigation include improved burner air and fuel balance, burner swirler design, fuel-oil gun nozzle tip configuration, and over-fire air system capability enhancements.

Evaluations to date indicate that even though NOx reductions are expected from combustion related activities, those reductions will be insufficient to meet the 0.15 lb/MMBTU NOx emissions rate limitation of Regulation 1146. Based on this information, it has been identified that in addition to the combustion tuning, application of selective non-catalytic reduction (SNCR) technology will be necessary to attain the required emissions rate limitation and still allow the continued operating flexibility required for MRGS3. The technical evaluation and engineering for SNCR installation is also still in the early stages, and unit-specific design, installation, and performance results have not been developed to date.

SNCR has been proven in industry to be highly effective in the control of NOx emissions when firing fuel oil or natural gas fuels. SNCR provides a control and capability flexibility that supports the wide-ranging, indeterminate operating characteristics of MRGS3 when firing either fuel. This will enhance the overall NOx reduction capability and performance of MRGS3, facilitating Delaware's attainment of air quality standards.

Successful installation of SNCR is highly unit specific, and its performance is dependent upon the ability to inject the reagent in areas of the proper combustion gas temperature range and in a spray pattern that provides contact with all of the combustion gas over the entire load range of the unit. While technical analysis will provide good staring points for the location of reagent spray nozzles, required spray patterns, and reagent injection rates (all of which are also load dependent), it may be necessary for post-installation tuning and modification/relocation of nozzles, patterns, etc to attain the best possible performance on this particular unit. The City of Dover commits to perform such post-installation optimization to maximize NOx reductions achievable from the installed NOx reduction technologies.

Additionally, vendor information, SNCR performance data provided by EPA (see note 1), and information provided by the Institute for Clean Air Companies (ICAC) predict that the SNCR, along with the combustions enhancements, should allow MRGS3 to comply with the Regulation 1146 Phase I NOx emissions limitation of 0.15 lb/MMBTU, on a rolling 24-hr basis.

It is anticipated that the completion of the combustion tuning and SNCR installation will occur in the fall of 2008.

Further, if MRGS is able to attain the high-end SNCR NOx emissions reductions identified in industry literature, it is possible that MRGS3 will be able to attain the Regulation 1146 Phase II NOx emissions rate limitation of 0.125 lb/MMBTU on a rolling 24-hr basis. This can only be evaluated following the completion of the combustion tuning and SNCR installation. Should these tasks be unable to attain the Phase II NOx emissions limitation, MRGS3 representatives will work with the Department to investigate the feasibility, sensibleness and effectiveness of additional NOx reduction activities for this particular unit, such as installation of SCR catalyst air heater baskets or in-duct SCR/hybrid SNCR/SCR. Note: such technologies have not yet been studied for application at McKee Run but have the potential for increased reduction in NOx emissions..

6) A description of the *emissions* monitoring methodology to be utilized for demonstrating compliance with the *emissions* limitations of this regulation, including estimated installation dates, start-up dates, and testing dates.

MRGS3 currently employs a continuous emissions monitoring system that that been installed, tested, and certified in accordance with the requirement of the Department and the Administrator of the EPA. The existing CEMS is currently utilized to demonstrate compliance with the requirements of the EPA's Acid Rain Program and the Department's Regulation 12 (Control of Nitrogen Oxides Emissions) and Regulation 39 (Nitrogen Oxides (NOx) Budget Trading Program). The existing CEMS shall be utilized to demonstrate compliance with the emissions limitations of Regulation 1146.

It is anticipated that as part of the SNCR installation project, ammonia (NH3) monitors may be added to MRGS3.

The existing CEMS are currently utilized to monitor, record, and report NOx and SO2 mass emissions in compliance with Department and EPA requirements (Acid rain Program, Regulation 39, etc). The CEMS and existing administrative practices will be utilized to monitor and ensure compliance with the annual NOx and SO2 mass emissions limitations of Regulation 1146.

In order to monitor sulfur in fuel oil, MRGS personnel will sample the fuel oil from the supply pipeline at the inlet to the *residual oil*-fired *unit* subject to this regulation each day the *unit* fires any quantity of oil fuel. Fuel oil samples shall be analyzed in accordance with ASTM D129-00, ASTM D 1552-03, ASTM D 2622-05, or ASTM D 4294-03.

7) **Identification of any planned changes to administrative or operating procedures or practices intended to achieve compliance with applicable *emissions* limitations of this regulation.**

Unit operating procedures for startup and shutdown will be modified to accommodate the SNCR system and refined after completion of the final installation and tuning. This will ensure that the SNCR system is properly placed in service each time that unit 3 is started up.

Note 1: EPA's AP-42, External Combustion Sources, Table 1.3-14, lists a NOx reduction potential ranging from 40% to 70% for application of SNCR to large residual oil-fired boilers.

I am authorized to make this submission on behalf of the owners and operators of the affected unit for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge true, accurate and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Anthony DePrima, AICP
City Manager
City of Dover, DE

Reference Documents:

Storm Service Report No. 06-213-1, NAES-McKee Run Plant, Storm Technologies Inc., submittal letter dated January 5, 2007

Selective Non-Catalytic Reduction (SNCR) for Controlling NOx Emissions, SNCR Committee, Institute for Clean Air Companies, May 2000

Economic Factors Affecting Retrofit NOx Control Decisions, Vincent Albanese, undated

Hybridization of Urea-SNCR with SCR, A Fit for the Future, Albanese, et al, Fuel Tech & Babcock Power, presented at ICAC's Clean Air Technologies and Strategies Conference, March 7-10, 2005

EPA's AP-42, External Combustion Sources